

ABSTRACT OF THE DISCLOSURE

The present invention provides a laser-based method and apparatus that uses absorption spectroscopy to detect the mole fraction of CO₂ in a high temperature gas stream. In a preferred embodiment, a distributed feedback based diode laser sensor operating at a wavelength near 1996.89 nm (5007.787 cm⁻¹) interrogates the R(50) transition of the $\nu_1+2\nu_2+\nu_3$ CO₂ absorption band in the near infrared. This transition is specifically chosen based on its superior linestrength and substantial isolation from interfering absorption by high-temperature H₂O, CO, NH₃, N₂O, NO, and other species commonly present in combustion or other high-temperature gas flows.

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